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REVIEW OF THE

# TELEGRAPH AND TELEPHONE

A JOURNAL OF ELECTRICAL, SCIENTIFIC AND MECHANICAL NEWS.

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### After Long Years.

As the hart panteth for the water brooks,
As the scared otter looks
Toward his wet covert when the dogs are near,
So do I thirst and strive, in hope or fear,
To be with thee.

As the red kine stand huddled on the lea,
Lowing until they see
Who comes their swollen udders to relieve,
So my full heart stands waiting to receive
A touch from thee.

As o'er her weaned child the mother yearns,
As the wrecked sailor turns
His face to land and wishes for the day,
So do I long and yearn to flee away
And rest with thee.

As the lone voices on Sophia borne
Over the Golden Horn,
Cry to the Moslem of a risen moon,
So, when thou comest, all my life's atune
With news of thee.

Ah, when thou comest! the old stranded years
Look fresh and bright through tears
And I am wild to welcome thee; yet why?
Thou knowest always that I live or die
Only for thee.

## ELECTRIC LIGHT.

### The Gaslight Must Go.

"Welcome the coming, speed the parting guest."

The first uttered words, relating to the planet we inhabit, according to the Scriptural record, were, "Let there be light," and we further read that "there was light."

And from that momentous hour to the present the human race, in all its generations, has been a seeker for more light.

First, the humble and easily-procured pine knot; then the smoky and extravagant oil lamp, in a thousand variations of figure and form; then the candle, composed of many different materials, from the tallow dip of the hovel to the lovely and delicate wax or paraffine candle that even to-day graces with a dim, religious light the altars of our cathedrals; and for the last ninety years gas, distilled from coal, has been the principal illuminating agent of all civilized communities, where coal is procurable.

The general introduction of gas, as a source of artificial light, is due to Robert Murdoch, who in 1792 began investigations into the properties of gases given off by various substances, in 1797 matured and exhibited a system of gas-lighting, and in 1798 fitted up an apparatus for the manufacture and distribution of gas, in the famous Soho engine factory of Boulton & Watt, where he was then employed, which partly lighted that establishment.

Thereafter the use of coal gas for lighting rapidly spread, and before 1816 all the principal towns in England were lighted by it.

The infancy of the gaslight was short; almost at once it blossomed into full growth, but, like nearly all things, animate or inanimate, that grow with abnormal rapidity, it has ever remained in a kind of stunted maturity—a giant, it is true, but a giant who is weak in the knees.

Let us now look at the great rival of the gaslight—the electric light.

In 1802, not many years after the introduction of the gaslight, as we see, the electric light was first introduced on a small scale by Davy; but for any useful result that accrued from its production for many years, the experiment might as well have been made by Davy Jones.

In 1808 and 1810 he made further experiments with the light, and then for thirty-four years, to quote from the elder Weller, "it laid dormouse, and was long thought to be hextinct."

It is a question whether electric lighting would have acquired any commercial importance if Davy's successor, Faraday, had not made his great discovery of magneto-electric induction, which has in these later days culminated in those powerful sources of electric energy known as dynamo-electric machines.

The enormous expense of zinc, compared with coal, when both are regarded as fuel, together with the comparatively feeble effects accruing therefrom, the inconvenience and labor attaching to large batteries, and the unwholesomeness of the gases they evolve, would tend to retard the use of the electric light, and, indeed, almost make it prohibitory, if the battery had remained the only source of electricity at our disposal.

But if the short infancy of the gaslight developed into a stunted growth, the long childhood of the electric light has at length resulted in a vigorous and ever-improving maturity; and in no branch of electrical science has invention been more prolific.

Whether we look at the machines for evolving the force, or at the different lamps for utilizing it, we are compelled to own that, once the ball set rolling, all hands have conspired to keep it in motion.

To-day, the arc lamps of Brush, Siemens, Weston and fifty others, are lighting up our streets, our factories, our public halls and our stores; the incandescent and semi-incandescent lamps of Prof. Edison, Lane-Fox, Werdermann and Reynier, are irradiating our exhibition buildings, and promising to make the electric light domestic; while the machines of Siemens, Gramme, Brush, Weston, Edison and a host of others, are doing their part, in producing the enormous quantities of electricity which are necessary in the maintenance of the numerous and ever-increasing centers of light we see all around us.

And when we take our walks abroad, and become conscious, that where there was one electric light but yesterday, there are a score to-day; we are convinced that the little one has become a thousand, and the small one a strong nation; and furthermore, that the unchallenged and undisputed reign of carburetted hydrogen is no more, and that it must surely give way to its young and vigorous rival.

Not without reason do we impeach the gaslight, and its wicked partners, of high crimes and misdemeanors; for we have suffered so far, long and uncomplainingly. Who that has white ceilings, has not had them prematurely blackened by the combustion of gas?

Who that has indulged in the luxury of a gas meter and half a dozen burners, has not had to pay a bill as long as his arm, for the summer season, when his house was completely closed, and gas by him totally unused?

Who that has found it necessary to study in the small hours, has not had his eyesight irreparably damaged by the yellow, unearthly glare of the gaslight.

Who has ever retired to the recesses of his stateroom, on a Fall River steamboat, in perfect health, without the horrid fear before his eyes, that he would wake the next morning a corpse? If any, speak, for him have I offended.

It is certainly time for the still small gaslight to go.

Yet, only as a light, is it desirable that gas should go. If the manufacturers of gas, would now realize that in the sweet bye and bye, and not a very distant bye and bye either their day of illumination must surely come to an end; and would turn their attention to gas stoves, to be used both for heating and cooking; and to gas engines, which for many purposes, even for example, that of the production of the electric light itself; could profitably be used in furnishing power; they might achieve such improved results as to create for themselves a new bonanza, fully as valuable as the old one. For the gas engine is eminently adapted for use in connection with the dynamo-electric machine, in the production of the light; and the residual and consequent products of the gas manufacture are so important that gas companies would be without competition in this line, on account of the low prices they could afford to charge.

This may be illustrated by the circumstance that the corporation of Bradford, England, was, in 1878, offered $50,000 for the residual products of its gas manufacture. Coke, ammonia, coal tar, and its numerous products, such as benzol, coal naphtha, several heavy oils, and carbolic acid, form part of these products. Benzol, being the basis of aniline, and the whole wonderful list of aniline colors.

All artificial light is obtained as a result either of combustion or incandescence, and the materials from which artificial light is produced, are principally bodies rich in carbon and hydrogen.

Such are wax, fats, oils, wood and coal, and ordinary gas lighting only differs from illumination by candles and lamps, in that the gas is stored up, and consumed at a distance from the point where it is generated.

The electric light fulfils the conditions, being a combustion very rich in carbon, since what the light feeds upon, is the vapor of carbon (developed by the intense heat caused by the passage of electricity), and aided by the passage of volatilized particles of carbon from one electrode to another.

It is said by interested parties that the electric light can never become popular and universally introduced, on account of the danger to life and property inherent in its constitution. The same objections were adduced by the oil dealers, when *gas* was first talked of. It was deleterious, unhealthy, explosive, and in many ways dangerous; nevertheless, in the march of improvement it came. Who will say that because we have a collision on some railroad nearly every day, that we must therefore go back to the stage coach; or that because a horse sometimes runs away and throws his rider, horses should be outlawed and a premium paid for their destruction?

"Speak unto the people that they go forward."

T. D. L.

## Electric Light for Hell Gate.

The delay in the operations for the erection of the electric light tower on Hallett's Point, Hell Gate, New York, is in consequence of certain unsettled questions with respect to securing a clear title or permanent lease to the land selected for the site. Captain Picking, Naval Secretary of the Lighthouse Board, will visit New York this week to investigate the subject.

## Electric Lighting Apparatus for War Purposes.

Powerful electric lights have become exceedingly important as engines of war, and the soldier and sailor vie with each other in the development of apparatus suited to their special needs.

Enormous increase in the power of single lights has been increased during the past few years by the great improvements which have attended the introduction of electricity as an illuminating agent. This has benefited the defence more than the attack, whether the operations be on land or sea, for, usually, the main functions of a powerful light are to guard against surprise, to give the defenders a timely warning, and to enable them to aim at the advancing forces. The defence can, moreover, employ the most powerful lights, the machinery for which is ponderous and not suited to the mobility required by the attack. Nevertheless, the use of a powerful light may frequently aid the attacking forces very materially. Thus at the attack on Charleston, during the War of Secession, the Southerners were prevented from repairing the breach in Fort Sumter by night on account of a deadly shrapnel fire which was directed upon the breach by the aid of a limelight, which is so inferior to the light now attainable by means of the electric arc.

Again, in an advance over obstacles it has been found that the attacking party will often receive great assistance even from the electric lights of the defence. As before stated, however, the balance of advantage appears to be considerably on the side of the defenders.

In all descriptions of siege operations the employment of the electric light has become a matter of considerable importance, many operations which it has hitherto been customary to perform under the cover of darkness being no longer possible, and other operations, such as the bridging of rivers, which formerly could only be carried on during daylight, being now possible on the darkest night.

## The Edison Light in France.

Besancon, France—Water Power Used.—The Edison Company at Besancon have had an experimental plant of three dynamos in successful operation since September 1st. The dynamos are run by a water-power situated at a distance of 1 300 meters from the places lighted up, and the current is sent through 1,100 meters of cable. These dynamos supply light for a tunnel through the rocks, in which 37 A lamps are used; also to light a street, several private houses and stores, among which are the Café Granville, with 35 A lamps, and the Maison Dubois, with 27 A lamps. This plant is installed with a view to the ultimate establishment of a Central Station, from which the whole town will be supplied with the Edison light; and a peculiar interest attaches to the plant from the fact of the use of hydraulic power situated nearly a mile from the scene of lighting.

## Electrical Navigation.

An electrical boat is no new thing, but there is a better prospect now than ever before that electrical boats may come into use to some extent for river and harbor purposes. As far back as 1838 Professor Jacobi of St. Petersburg constructed a boat whose mechanism was operated by an electro-magnetic motor, worked by a Daniell battery. His little craft was tried on the Neva, and accomplished a mile and a quarter in an hour. No progress in the direction of improving on this experiment was made in the next forty years. Some two years ago, however, M. Trouvé of Paris, propelled a skiff up and down the Seine, using for the purpose a motor operated by the Planté accumulator, which had been previously charged. The experiment was reported as successful, but the plan was never tried on a more extensive scale, that we have ever heard.

Now, however, Professor Silvanus P. Thompson has adapted a pair of Siemens motors to an iron boat built by Rockenzaum of London, and a trial trip recently made on the Thames was a pronounced success. The boat has a screw propeller, designed to make three hundred and fifty revolutions per minute. The motors are operated by stored electricity, contained in forty-five small boxes—a system devised by Messrs. Sellon and Volckmar, as an improvement upon the method of Planté. These small boxes are charged through wires connecting with the shore, and are calculated to furnish motive power sufficient to last six hours, yielding an amount of power equal to four horses. The boat was run against the tide, but attained a speed of eight knots an hour, nevertheless. This experiment was undoubtedly far more satisfactory than the one made by M. Trouvé in 1880, and it goes, without saying that Prof. Jacobi's attempt in the same direction becomes insignificant in comparison—indications that encouraging progress is making. The warmest advocates of electricity as a motive power, will be slow to predict that steam is likely to be superseded all at once by the more subtle agent; but for small craft it is not unlikely that stored electricity will soon be quite generally used, the electrical machinery being lighter and more compact than steam engines, while it is freer from vibratory motion, and altogether smokeless. There are many persons who never fail to be sea-sick in crossing the English Channel, who attribute their nausea to the smell of the oil used in lubricating the machinery. They profess to believe that when oil becomes heated it produces sea-sickness in cases where the effect of rough water could be withstood. To such persons the efforts made by Professor Thompson to furnish a substitute for steam engines on short passages will be hailed as glad tidings of great joy, though we are inclined to class the theory in question with that of the elevated husband who informed his tearful spouse, on reaching home, at day break, that "it was that las' piece lemon peel that did er business for (hic) yours truly."

## The Griscom Electro-Motor.

*To the Editors of the Electrical Review.*

Dear Sirs,—In the *Electrical Review* of September 23d, an able writer, who discusses my double induction motor, quotes and combats a theory which he attributes to me. This theory is one of the many advanced in explanation of the motor by various European periodicals, but of which I plead entire innocence; in fact, I have purposely abstained from offering an explanation of the phenomenon which, for want of a double name, I have called "double induction." This phenomenon is described by the famous Mr. Hospitalier as follows:

"The current of the electric source then only traverses the armature. Under these conditions, if the current of the field magnet is open, the motor goes slowly enough, and even stops sometimes. By closing the circuit of the electro-magnet on itself, the speed of the motor is greatly increased, *the currents of induction developed in the wire which forms a closed circuit will then polarize the fixed magnet continuously, and maintain its magnetism with polarities, suitable to the direction of its rotation.*"

Of course, no one can suppose that a motor can produce more electricity than is supplied to it, and the writer does me an unconscious injustice in attributing such a fanciful theory to me. I even go further, and believe that induction, far from being an obstacle in motors, is the measure of their efficiency. If other views with regard to this latter proposition are held in England, I should be very glad to see them expounded.

Yours truly, W. W. Griscom.

Philadelphia, October 6th, 1882.

## Electric Lighting.

A special meeting of the Dundas Gas Commissioners was held last week, for the purpose of considering the advisability of applying for a Provisional Order to supply electric light to the town. A report by the gas manager on the subject was read. It stated that the works necessary for supplying the electric light to the town would consist of two centers of supply—one at the gas works and one in Ward Road. The size of the engines required would, of course, depend upon the demand for the light. A very convenient form, the dynamo machine, might be had, which would supply forty arc lights, and to drive this machine would need an engine of from forty to fifty horse-power nominal. This, to begin with, would be sufficiently extensive. He considered that a fair maximum price would be 1s. per hour for the arc light, and 4d. per hour for the incandescent lights. For the safety of consumers and the public, he recommended that all wires in the principal streets should be laid underground and encased in tubes. The commissioners, after full consideration of the matter, unanimously resolved to apply to the Board of Trade for a Provisional Order to supply electric light to the town.

## Electrical Exhibition.

The Electrical Exhibition at the Westminster Aquarium, which is now arranged shall be opened on December 1st, is likely to be a great success. The entries of motors, to which just now public interest seems attached, will be large and interesting. Electric light entries are also numerous and representative. The matter of distribution seems to have received attention, and the different systems will find many exponents. The Edison electric light will form a very attractive feature as usual.

The large and very fine machine, the Gordon dynamo-electric generator, the design of which has occupied Mr. Gordon for a considerable time, is now in operation at the Telegraph Construction and Maintenance Company's Works, East Greenwich, England. The aim of the inventor has been to provide a generator of a size and power sufficient to supply from five to ten thousand incadescent lamps; he being persuaded that such large machines are necessary in order to insure the economical production of the electric light. It is constructed on the plan of revolving the electro-magnets and keeping the induced coils fixed. We shall publish next week a full and illustrated description of the machine, which contains many novel and ingenious features. On Wednesday evening the new generator was publicly exhibited by Mr. Gordon and Mr. H. Clifford to a number of gentlemen interested in electric lighting; and the works of the Telegraph Construction and Maintenance Company were illuminated throughout by 1,300 Swan lamps, maintained by it while working at a fraction of its full power.—*Engineering.*

A local contemporary says: "It seems that there is an immediate prospect of the manufacture of electric lighting apparatus taking practical shape in Glasgow. The great drawback to its general use hitherto has been the expense of the necessary appliances and the motive-power, but if electric generators, motors, and lamps can be manufactured as cheaply and expeditiously as the Universal Electric Company undertake to do, there can be little doubt that for public works and street lighting at least, the electric light will become pretty general."—*London Electrical Review.*

## Edison Light in a Railway Station at Paris.

A plant of 180 A lamps is installed in the St. Lazare Station, at Paris, of the Western Railway of France, and has been in successful operation for the past three weeks, giving great satisfaction to the Railway Company and to the public. The lights are distributed in the waiting rooms and in one of principal passages. This experimental installation is made by the Western Railway Company with a view to the introduction of the light in all stations of the Company.

## Electrical Storage.

MR. BUELL'S SECONDARY BATTERY EXHIBITED IN NEW HAVEN.

A single cell of secondary battery, weighing about twelve pounds and charged by two Grove elements, was exhibited at Paul Roessler's store yesterday by Charles E. Buell of New Haven, who devised it, It would heat platinum wires red hot and rapidly revolve a small magnetic motor. The advantages claimed for this form of battery over other secondary batteries are: Lower cost of construction, less weight for a given power, and shorter time for charging. Mr. Buell states that this form of battery is as free from faults due to local action as those of Fauré, Sellon and others, and believes that secondary batteries similar in principle and not liable to local action are the only needed improvement to insure commercial success in the use of electricity for light and power.—*New Haven Register.*

## The Chemistry of the Plante and Faure Accumulators.

PART IV.—THE FUNCTION OF SULPHATE OF LEAD.

[From Nature of the 19th inst.]

In our previous communications on the chemistry of lead and peroxide batteries, we have frequently remarked on the formation of lead sulphate and its importance in the history of a cell.

In Part I.* we showed that the local action that takes place at first energetically between the metallic lead and the peroxide is gradually diminished by the formation of sulphate of lead.

In Part II.* we stated that in the original formation of a Faure cell, sulphate of lead is oxidated on the one plate and reduced on the other. We also described an experiment in which two platinum plates were covered with lead-sulphate immersed in dilute sulphuric acid, and placed in the circuit of a galvanic current; the result being that "the white sulphate was decomposed to a large extent on each plate, the positive being covered with deep chocolate-colored peroxide, the negative with gray spongy lead."

In Part III.* we showed that on the discharge of a cell, lead sulphate is the ultimate product on both plates.

It might naturally be inferred from our previous statements that in the re-charging of a cell, this lead sulphate would be oxidated on the one plate and reduced on the other, as in the original formation. This matter, however, has given rise to some controversy. All subsequent experimenters admit the *oxidation* of the lead sulphate, but Dr. Oliver Lodge could not obtain any reduction of it when pure sulphate was employed. Sir William Thomson also, when experimenting with two platinum plates and layers of sulphate, obtained only a doubtful indication of reduced metal.

The question as to whether the sulphate is reduced or not on re-charging a Faure cell is one of vital importance; for if the sulphate formed at each discharge accumulates on the positive plate it would clog up the space, and, what is perhaps worse, a fresh surface of the lead would have to be oxidated (or rather converted into sulphate) at each discharge. Thus the positive plate will be continually corroded, and its life will be limited.

We have already replied to Dr. Lodge in *Nature* (Vol. XXVI. p. 342), but we thought it desirable to repeat the experiment with the platinum plates, especially with a view to determine whether the reduction was effected slowly or with any rapidity. We fastened 20 grms. of the white sulphate upon a negative plate by binding it round tightly with parchment-paper, placed it vertically in the sulphuric acid, and passed a continuous current of somewhat under an ampère. The hydrogen was at no time wholly absorbed—indeed the greater part of it certainly escaped—but after a lapse of twenty-four hours, small patches of gray metallic lead became distinctly visible through the wet parchment paper; and these gradually spread in an irregular manner. At the end of ten days it was found that the whole of the sulphate, except a few small patches on the surface, was reduced to a gray spongy mass. Although there could be no reasonable doubt that this was metallic lead, a portion of it was tested chemically, and proved to be such.

It thus appears that the *reduction* of the pure sulphate of lead is an absolute fact, although it does not take place so easily as the oxidation.

In an actual cell the sulphate of lead is of course mixed with other bodies. Thus in the formation of a Faure battery, the minium is converted by the sulphuric acid more or less completely into peroxide of lead and sulphate. We have already described an experiment in which 4,489 cc. of hydrogen were absorbed on a plate, the materials of which were capable of absorbing only 4,574, cc., if the whole sulphate as well as the peroxide was reduced. In our notebook we have the particulars of four other experiments made in each case with the same, or nearly the same, amount of material, in which 4,199, 4 575, 4,216 and 4,387, cc. respectively were absorbed, although perhaps in not one of these cases was the experiment continued until the action was absolutely complete.

As, however, it may be objected that the amount of sulphate produced upon these plates was an unknown quantity, we have in a recent experiment treated the minium in the first instance with a considerable amount of sulphuric acid. This gave us a mixture which, on analysis, was found to contain 18.5 per cent. of sulphate of lead. This mixture, when submitted to the reducing action of a current yielded a mass of spongy lead that contained only a mere trace of sulphate.

As it seemed desirable fully to establish the fact that the sulphate of lead formed on the discharge of a cell is reduced in the subsequent charging, we took the quondam lead plate of a fully discharged cell, determined the proportion of sulphate to unaltered spongy lead, and submitted it to the reducing action of a current. The amount of sulphate on the plate before passing the current was found to be 51 per cent., but, after the passage of a current of about an ampère for 60 hours, not a trace of it remained.

Hence it may be concluded that, during the alternate discharging and re-charging of a Planté or Faure cell, sulphate of lead is alternately formed and reduced on the lead plate, and that the plate itself is not seriously corroded. It would, however, appear desirable not to allow the whole of the spongy lead to be reduced to sulphate during the discharge, for two reasons, viz.: (1) because the supporting plate stands a chance of being itself acted on if there is not a sufficient excess of spongy metal; and (2) because the presence of this excess tends to facilitate the reduction of the sulphate.

We have already shown that sulphate of lead is produced by the local action that takes place between the peroxide and its supporting lead plate during repose. The same local action also takes during the charging of the plate, as was pointed out in our second communication, and this sulphate is, in its turn, attacked by the electrolytic oxygen. In this way the absorption of oxygen in forming the negative plate ought never to come to an end. In order to see whether this was the case, we allowed an experiment to continue for 115 hours, although the main action was over in about 40 hours. For the last two days of the experiment, the amount of oxygen absorbed was pretty constant, being about 9 cc. per hour, which is equivalent to 0 24 grms. of sulphate of lead formed and oxidated The whole charge on the plate was 40 grms. of peroxide. This local action also takes place during the discharge, as is evidenced by the sulphate of lead formed on the negative plate always exceeding in amount that formed on the positive plate.

Through this local action taking place during the formation of the cell, during repose, and during the discharge, the lead plate which supports the peroxide must be continually corroded more and more; and it is probably due to the insolubility of the sulphate formed that the destruction of this kind of secondary battery is so materially retarded in practice.

J. H. Gladstone.
Alfred Tribe.

* See *Electrical Review*, pp. 21 and 211, Vol. X, and p. 64 of Vol. XI.

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The Western Associated Press has established an independent agency in Washington under the management of Mr. Walter P. Phillips. Among his assistants is Mr. P. V. DeGraw, an old operator who for some years past has been on the staff of the New York Associated Press at Washington.

## A Lucky Couple.

Not so many years ago that it seems more than a few weeks off, there was added to the Western Union messenger force at Providence a handsome youth, who soon graduated from the office and figured conspicuously for a brief period as a writer of sprightly paragraphs for *The Morning Star*. While thus engaged the announcement came that an instrument capable of transmitting speech had been invented by a man named Bell, residing in Canada. Afterwards the inventor Bell and the ex-telegraph messenger came together, and those who were present at the first exhibition of the telephone in New York, made over a wire extending from the St. Denis Hotel in New York to some point in Brooklyn, will recall that Professor Bell, who managed the St. Denis Hotel end of the wire, was continually calling for "Mr. Gower," and owing to the imperfect manner in which the telephone worked and the tardiness with which Brooklyn responded, "Mr. Gower" was regarded by the somewhat skeptical audience as rather more of a joke than a reality. But there was one person among the little band assembled, and which included General Eckert, Mr. A. S. Brown and Mr. James D. Ried, who knew that "Mr. Gower" was a living, breathing fellow mortal, and that person was the writer. He had known him as a boy in Providence, and had watched his progress with lively interest. It came about ultimately that Mr. Gower should take the telephone to Europe, and while there he made certain improvements which enabled him to patent what is known abroad as the Gower telephone. He is now thirty years of age, and his wealth is estimated at a million and a half of dollars. He made his money in the foundation of telephone companies in Europe, and he has recently sold his English interest for half a million of dollars. He continues, however, as a large owner in French companies. Young Gower is a native of Sedgwick, Maine, and he is soon to marry Miss Lillian Norton, also of Maine. Miss Norton has likewise achieved fame abroad, being the favorite soprano in Paris. She is twenty four years old, and was born in Farmington. At the age of seventeen she began her musical culture in the Boston Conservatory, where she remained three years. She then went to Milan. After her Italian course she was engaged by the Grand Opera House at St. Petersburg for $1,000 for the season. The next year her salary was doubled. She created a furor in St. Petersburg and in Moscow. She dined with the Czar and the imperial family. At Paris she is under a three-years' engagement at $12,000 per year, has luxurious apartments, a carriage and liveried driver, etc. This, with her prospective husband's million and a half cash capital, ought to enable the young couple to keep the wolf from the door for a while at least. Starting with nothing but ability a few years ago, they have done very well for a pair who were born "away down in Maine."

The Manhattan District Telegraph Company of New York, was incorporated on Nov. 2, with a capital of $100,000. The line is to run from a main office in the vicinity of the Stock Exchange to other points in the city where branch offices may be established, and from such offices along, across, through, and in the streets, over buildings and into buildings, so as to connect such buildings with the offices of the company, and to connect such offices with each other. The company expects to begin operations within two weeks and to open messenger offices at Thirty-first street and Broadway, and at Church and Vesey streets. By Dec. 1 it is proposed to open an office in Wall street and one in Twenty-third street, near Broadway. The board of directors of the new company is composed as follows: W. H. Wolverton, President of the New York Transfer Company; H. W. Pope, Postmaster H. G. Pearson, A. S. Dodd, of Dodd's Express, and H. W. Gwinner, of the Pennsylvania Railroad. The officers are: President, W. H. Wolverton; Vice-President, H. W. Pope; and Secretary and Treasurer, H. W. Chipman.

Since our last issue, news reaches us that the Mexican Telephone Company has recently acquired some valuable Government concessions, and has also made a number of profitable private line contracts. The exchange subscription list in the city of Mexico continues to increase rapidly, and rentals have been raised to $5 per month, beginning with November 1st. The sub-companies report two additional exchanges under way, and those already in process of construction are rapidly acquiring new subscribers. The company's position now is very strong, and they feel that they have nothing to fear from outsiders. Intelligence from Mexico sets forth that the company is now in a position where it will not only pay all its own operating and general expenses, but can see a good prospect for a first dividend. It is not improbable that there will be a thousand subscribers to the Mexico City Exchange within the next ninety days. About $90,000 has already been paid into the treasury, and ample provision is made for all the money necessary to properly develop and push the work. Large shipments of material continue to go forward by every steamer. The Mexican press are warm in their praise of the manner in which the business is conducted and service rendered. Success attend them!

## Underground Electrical Conductors in Boston.

Every one in any way connected with telephones, will readily concede that if in the course of a few days and nights all the telephone wires could be placed underground, *without* inordinately heavy expense, and with fair assurance, that once there, they would work satisfactorily, the new order of things would be a benefit to all concerned, *i. e.*, the public, the property owners, and the telephone companies.

When we recognize the true difficulties which stand in the way of such a felicitous transition, we need not be surprised that the day of subterranean wires has been slow in coming, or that telephone companies have been slow in adopting the use of underground systems.

For instead of the lively work we have imagined in the foregoing lines, such work as that performed by the magic builders of Aladdin's palace, all work tending to place wires below the surface of the earth, is necessarily laborious in the extreme, slow in achievement, and involving heavy outlay of money and material.

Moreover, and this is the most serious consideration, it is a leap in the dark, for not any one can dare to say, that telephones can be satisfactorily operated in subterranean wires.

Yet the leap in the dark is now being made in the streets of Boston, and by the American Bell Telephone Co. During the spring and summer of the current year application was made to the Common Council of Boston, for the right to lay wires under certain of the business streets of the city. After considerable delay, and reference to this, that, and the other committee, the company's request was granted, and steps were at once taken to lay a wire carrying conduit.

Many plans were contemplated, and the following was decided upon, to be employed at least in the initiatory lines of communication. To lay cables carrying multiple conductors, in iron tubes, in sections between a number of vaults or cellars for the main lines; and to bring the wires out, at various central points, and then radiating them to the different subscribers' stations within a limited area of such central points.

In the prosecution of this design, a trench is ex-

cavated about four feet deep in the middle of the street, and first paved with a layer of common cement, some five or six inches thick. Upon this are laid a number of three inch wrought iron pipes, jointed together by sleeve couplings, screwed on by means of gas thread, each of the joints being made in red lead, and thus rendered water-tight.

A second thick layer of cement is then applied, and upon that a second layer of pipes. The cement is then laid on and over the upper layer of pipes so as to embed the whole of them, and cause them to be completely impervious to moisture.

At or near the street crossings a vault is built in brick, the bottom of which is deeper than the lowest point of the trench. The series of pipes from either side enter these vaults, and in them the wires can be interconnected, interchanged, and manipulated, as may be found desirable.

The experimental route, at present, extends only from the corner of Pearl and Franklin streets, at which is located the central office, to State street, on one side, and up Franklin street to Washington on the other. Both routes start from a main vault at the corner of Pearl and Franklin. The Pearl and Congress street line has working vaults along its line at the following points: Post-office Square, Congress, and Water streets; Congress street and Exchange Place, and terminates in a vault at the north side of State street. Along this line are two layers of four pipes each, eight in all; each pipe being capable of carrying a hundred or more wires

The several vaults, in addition to being carefully and massively walled, are further protected from moisture by pouring hot pitch between each course of brickwork and the surrounding earth.

The Franklin street route is supplied with working vaults at Congress street, Devonshire street, Federal street, and Arch street, with perhaps one still to be built at Hawley street This line has two layers of three pipes each, six in all.

As each pipe is laid an iron wire is threaded through it, so that when a line of pipe is complete, between any two working vaults, a continuous wire is also inside that pipe between the vaults.

By attaching groups of insulated wires, or a cable, to this threaded wire, they can of course easily be drawn through from vault to vault. It is probable that the lead-covered Western Electric Cable will be used inside the pipes, as a medium of communication although several varieties of cable may be tried.

It will not be a very difficult matter to lay and re lay any section.

To bring the different wires out where they are required, several plans have been thought of. In some cases, it will be most practicable to run lateral branches from the vaults into adjoining cellars or courtyards, and from the terminal vaults of these branches or ramifications run tubing of an ornamental or æsthetic character up the sides of the surrounding buildings, and thus disseminate the wires.

Another plan, and one likely to be adopted, is to erect a high, hollow pole or column, near the manhole of the vault, run the wires up through this column, and from the top disseminate them to their different destinations. The column, in this case, might be built directly over the manhole, and serve also as an approach and protection to the manhole and vault.

The first vault, near the central office, has twenty-two pipes running into it, and is, or will be, connected by them with the cellar of the building in which the exchange is located; the wires from the cellar to the operating room of course being led the most convenient way.

On account of the well-known effects of static and dynamic induction, especially the former, it is not anticipated that any great length of subterranean conductor can be telephonically operated, but for such a limited extent as is covered by this experiment let us hope that no radical trouble will be manifested. If this is successful, more of the same kind will follow.

### Ye Old Timer.

The *News* has had the pleasure of interviewing probably the oldest telegraph operator in the West, Mr. J. B. Stone, of Kenosha, Wis. Mr. Stone learned the art in 1848 in Southport, twenty five miles south of Milwaukee. At that time there was but one wire between Buffalo, N. Y., and Milwaukee, and, as Mr. S. says, "that one wasn't kept busy." In those days, before the advent of railroads in the West, all telegrams were received on what is known as a "register," and each operator received express orders from the division superintendent to "do no business by sound." Then two men were engaged in each office, one to read the message as it was impressed upon the paper, and the other to copy it for delivery. When a "press report" was to be received, the newspaper reporters were sent for and each wrote the report as the operator read it from the register. As an operator became accustomed to the click of his instrument he soon found himself unthinkingly reading the message by sound, and in a few years the managers found they could do away with the help of one person in each office, and the method of reading by sound was adopted. Mr. Stone says that he does not really think that Morse, the inventor of the electric telegraph, ever expected it would be read by sound. In 1845, what was known as the Northwestern Telegraph company was formed. Four men, among whom were Mr. Stone and the late Senator Sholes of Milwaukee, owned the whole Northwestern circuit. This was before there were any railroads leading west of Milwaukee, and the owners being fearful of results, sold out their interests for a trifling sum. To-day the Western Union Telegraph company control the Northwestern circuit, having leased it of the owners for ninety-nine years, and guaranteeing seven per cent. interest on $2,000.000, the amount invested. Mr. Stone was the operator at Madison, Wis., during the session of the first legislature of that State in 1848-9. Of late he has superintended several telephone exchanges and is fully conversant with the inner workings of that peculiar instrument.

Mr. Wake, engineer of the River Wear Commissioners, and Mr. Irish, manager of the Northern District Telephone Company, in England, have made some interesting experiments in the use of the telephone by divers. The length of the cable connecting the receiver in the diver's helmet with the transmitter above water was 600 yards. It was found that the diver could converse with ease, and ask for tools in any position in which his work might require him to place himself.

At a special meeting of the Associated Press on the 8th instant, the resignation of Mr. J. C. Heuston as General Agent was offered by letter and unanimously accepted. Mr. Erastus Brooks, who has for many years represented the *Mail and Express* in the association, was chosen to succeed him and will enter upon the discharge of his duties. Mr. Heuston, it is understood, will henceforth devote himself to the practice of law.

### Inappropriate Levity.

We reprint, in another column, a paragraph from a San Francisco paper in which it is related that two burglars, who had undertaken the cheerful task of relieving a citizen's house of its valuables, retired in sorrow upon learning that the inmates had not yet got in the electric light, and, being consequently consumers of gas, could not have much left. The author of this tale adds that in their remorse the burglars left a quarter of a dollar with which their would-be victim might repair the lock, which they had shattered in invading his premises.

This is levity unseemly and inappropriate. We feel hurt that any newspaper writer should have the effrontery to tell such an absurd story as the above. Everybody knows that hundreds of gas consumers have as much money left at the end of the month as they pay to the company. The charges for gas are merely nominal; the quality of the article furnished is far superior to candle light; and when one has a notion that he has been overcharged, all he has to do is to make a complaint. How many of the hundreds who close their houses for the summer, and receive their gas bills just the same as if they had remained in town, but make a complaint about it? These would-be humorists, such as the San Francisco prattler, ignore the fact that the gas companies are always willing that their patrons should complain. "But it doesn't do any good," says a friend at my elbow. Well, what of that? Isn't it a real indulgence to be permitted to complain? Truly, the American people expect too much.

Another laudable thing about gas companies is the way in which they close out annoying bus'ness relations with their disgruntled customer. A gentleman in a neighboring city, who had said, in paying his bill, that it seemed too large, found, on returning home, that illumination by candles was the order of the night. Inquiry developed that, with a kind forethought which cannot be too highly praised, the gas company had removed the meter and cut off the gas during the afternoon. It was a simple way of removing a possible cause of complaint in future, most assuredly. To some minds this sort of procedure will suggest a story in which a young naval officer, who was arguing with Secretary Thompson, figured rather painfully. The young man held that under the law the Secretary of the Navy could not order a naval officer beyond certain limits without the consent of the President. "He can't, can't he," roared Thompson. "The law be damned. I'll show you what I can do. I order *you* to join the Asiatic squadron."

But in reality there is a wide difference in these two cases. The action of Secretary Thompson was arbitrary and in violation of the law. But no one doubts that the gas meter was taken out, not for spite, but just to avoid further trouble. In view of this, we do not altogether relish this attempt at humor on the part of our San Francisco contemporary. As we showed in our last issue, the representatives of the gas companies are philanthropists. They are by no means advance couriers of robbery, who take the bread from honest burglars' mouths, as one might infer, if we credited such stories as this, which comes to us as "a voice from a farther sea."

### Mexico Moving.

The revenue of Mexico for the last fiscal year was $30,000,000, while from 1867 to 1877 it averaged only $16,000,000. If that country continues to progress as at present, the coming generation will celebrate the centennial of independence in 1921 with the same just pride as did the Americans in 1876.

"It is no use, Bill," said a burglar to his pal while they were peering round in an up-town cellar the other night. "See here, this family uses gas." "You don't mean it?" "Yes, I do, here's the meter. Let's go, Bill. Poor devils, they can't have much left." And leaving a quarter to pay for repairing broken locks, the sympathizers with misfortune retired.—*San Francisco Post.*

# Telegraphic.

The various telegraph companies contrive in one way or another to keep their affairs pretty constantly before the courts William Hendry Cameron, whose suit against the Mutual Union was withdrawn when Jay Gould became a large stockholder, and the prospective controller of that company has reappeared in the courts. He brings action as a shareholder in the company, and claims that the modification of the original agreement between the Mutual Union and the firm of John G. Moore & Co., is fraudulent, and asks the Court to declare them null and void. The renewal of Mr. Cameron's suit is a natural sequence of the recent move on the part of the Mutual Union people to freeze out the Gould representation in the Company. "It is a cold day," etc., and the winter weather has not yet set in. Meantime, there is trouble in an unlooked-for direction. It will be remembered that when the consolidation between the Western Union, American Union and the Atlantic and Pacific Telegraph Companies was effected, the event was followed by several suits, in one of which William S. Williams figured conspicuously. When his action was begun, Mr. Williams obtained a temporary injunction against the companies. The motion to continue the injunction was argued at great length before Judge Sedgwick, who decided that the injunction must be continued during the trial of the action. The suit came on trial before Judge Truax at Special Term. Judge Truax dissented from the view of the law in the case taken by Judge Sedgwick and decided that the consolidation agreement in all its parts was legal and binding. An appeal to the General Term was taken on the part of Mr. Williams from the judgment at Special Term, and was argued before Judges Freedman, Arnoux and Russell, before whom neither this action nor the similar action brought by Rufus Hatch had ever come in any shape. The result has been that the Superior Court reverses the decision delivered by Judge Truax, and a new trial is ordered. And, as if Cameron and Williams were not capable of breeding trouble enough in the telegraphic families, Uncle Rufus Hatch inserts himself anew as a third annoying factor in the problem. His original suit, which shared the fate of the Williams' suit when it came up before Judge Truax, gets better treatment at the hands of Judge Freedman. Mr. Hatch protested against the consolidation and sought to restrain its promoters from carrying it into effect. By the former decision he was laid out as cold as a wedge, but now comes the day of his triumph, for the decision in his suit is also reversed, and a new trial is likewise ordered in the interest of Rufus. Dr. Green has been duly interviewed and says that the Hatch and Williams suits amount to nothing. Of course that settles the whole matter.

131,100 miles of poles, 374,368 miles of wires, 12,100 offices, nearly thirty millions of messages transmitted, over seventeen millions of dollars received, over ten millions paid for expenses, leaving over seven millions of dollars in profits—such are the astonishing returns of the Western Union Telegraph Company for the single year ending June 30, 1882. Enterprise, good management, and the possession of valuable patents have been the basis of this extraordinary success.

THE TELEGRAPH CO. — The annual meeting of shareholders of the Great Northwestern Telegraph Company will be held in Toronto on the 29th inst. The meeting will be a special one for the purpose of providing means, by the issue of the bonds or otherwise, as may be deemed advisable, for the laying of a cable in Lake Superior under the provisions of the Company's charter, and extending the facilities and system of the Company.

## Telegraphic Communication with Valparaiso.

VALPARAISO, CHILE.—The cable between Callao and Mollendo being repaired, communication by telegraph is now open direct between Valparaiso and points in the United States and all intermediate stations on the west coast of South America. The opening of these lines, connecting with the Central and South American Telegraph Company's system at Lima, will be a saving of some fifteen hours in time between Valparaiso, the United States and Europe, as compared with the old route via Pernambuco and Lisbon.

## Postal Telegraphy.

Information comes from Washington that Postmaster General Howe will, in his forthcoming report, urge upon Congress the necessity for the Government entering upon the domain of postal telegraphy. He says it is the business of the Post Office Department to facilitate prompt and rapid intercourse between the people. "We have," says the Postmaster General, "at present a monopoly, in fact an undisputed one, of all the slow methods for transmitting letters, while corporations enjoy the exclusive privilege of sending by the rapid system messages and business communications. In my opinion the Post Office Department ought to be equipped with every facility for postal telegraphy. The Government can do it cheaper than companies and certainly with the same promptness." The Postmaster General's object is to press the matter upon the attention of Congress and let that body devise the best means for carrying out the system. The attitude of Judge Howe on the postal telegraphic question has again brought to the front Ex-Postmaster General Creswell, whose effort, aided by his efficient private secretary Mr. Robert B. Lines, came so near making postal telegraphy a *fait accompli* during the Grant administration. General Creswell is much more practical in his ideas than many of the men who promote telegraphic schemes. He has no wild goose plan for "moving the mails of the country" over one wire by means of automatic machinery. He simply proposes that the Government shall construct a line from Washington to Boston, connecting Baltimore, Wilmington, Philadelphia, New York, New Haven, Springfield and Worcester in the circuit and demonstrate that the Government is in earnest. Companies owning plants in other directions would be glad to sell at a fair appraisal, he thinks, and postal telegraphy would thus become an established part of the Post Office Department. At a short session of Congress, when so many members are certain of retiring to private life, it is not expected that the same interest will be taken in the project that it would receive at the beginning of the session. Valuable data have, however, already been accumulated, showing that the expense would not increase the cost of the service materially over the cost for ordinary mail service.

## Strike of Telegraph Messengers.

The American District Telegraph Company details a certain number of boys to carry the messages of the Western Union Telegraph Company. These boys, known as Western Union boys, are paid at the rate of two cents per each message delivered, and make about $4.50 per week. The boys employed in delivering the Wall Street dispatches, to the number of about fifty, struck for two cents and a half a message. As the strike affected only a part of the boys at the disposal of the American District Telegraph Company, no great inconvenience was experienced, the regular boys of the company doing the Western Union work.

## The Decision in the Telegraph Cases.

The decision of the General Term of the Superior Court in the telegraph cases is a judicial declaration that the attempt to consolidate the American Union and the Atlantic and Pacific Telegraph Companies with the Western Union was unlawful. The cases were tried at Special Term before Judge Truax, who upheld the consolidation as legal. The General Term does not differ from him as to the facts, but Judges Freedman, Arnoux, and Russell hold that his view of the law is erroneous. They therefore reverse the judgment in favor of the Western Union, and order a new trial.

The transaction thus condemned is in substance an attempted purchase of the property, rights, and franchises of the other telegraph companies by the Western Union, the purchase price to be paid by new stock of the latter, to be issued for the purpose.

The defendants sought to justify this transaction by reference to chapter 568 of the Laws of 1870, under which any telegraph company organized under the laws of this State is authorized to sell, lease, or convey, or acquire by lease, purchase, or conveyance, the property, rights, privileges, and franchises of any other telegraph company, and to receive or make payment therefor in the stock of the purchasing corporation.

If the acts of the three companies now under consideration fall within the purview of this statute then, as Judge Arnoux well says, the Western Union cannot legally be prevented from buying up any and every telegraph line in the country.

But the Judge points out that the power to purchase under the statute is limited by the very language of the law itself. The authority which it confers is expressly stated to be given "in order to perfect and extend the connections of telegraph companies in this State, and promote their union with the telegraph systems of other States." Only for these purposes can one telegraph company lawfully buy up another. They were none of them in the contemplation of these three corporations when the agreement of consolidation was made. The end sought by the purchasing company, the Western Union, was not to perfect its connections or to promote its union with the telegraph systems of other States, but to overcome competition. The act of the Legislature does not permit consolidation for this purpose. At least, the General Term of the Superior Court refuses to give it so broad a construction:

"Publicists and jurists agree that the welfare of a commonwealth is best promoted by competition in business, and that laws in restraint of trade must be strictly construed The common mind accords with this, as is evidenced by many familiar proverbs. It is part of the public policy of the State which the courts take judicial knowledge of and enforce. Competition affords a stimulus that is absent when there is a monopoly. It is not necessary to multiply examples, but one germain to this subject may be mentioned. The English press complains that since the British Government has included the telegraph within its postal service there has not been an important invention in telegraphy in Great Britain, and that hereafter they must look to the United States for improvements and developments therein. We cannot suppose that the Legislature ever intended to put the community in the power of one corporation in a matter which has become of such vital importance to every interest as the telegraph has. It would require the very clearest and most positive expression of such intention for the courts to hold that the Legislature intended to permit any corporation to overcome all opposition or competition, especially when it enters into all the affairs of our modern life, as the counsel for the plaintiff so eloquently described the telegraph in his oral argument. We can say with the Court of Appeals in repeated decisions in the town

bond cases that such legislation is contrary to public policy, and that the letter of a law that would confer such privileges of purchase as defendant's counsel here claim, must yield to the spirit of the law that would protect the people against any such subjugation. But it is not necessary to go to any such extremes, for no one can find in the letter of the law any unlimited power of purchase or any right to purchase competing lines for the sole purpose of ending competition."

The question must eventually be determined by the Court of Appeals; but for the present the opinion of the General Term is the law. It is so strongly sustained by reason that we are inclined to think it will be affirmed by the tribunal of last resort.

In any event, a discussion of the questions involved, in a manner which attracts so much attention, is a public benefit. It will lead the way to intelligent legislation in regard to the union of corporations for the purpose of destroying competition.

## Electric Coupling for Train Telegraphs.

Mr. Edward D. Parker, of Salina, Kan., has lately received a patent for a new electric coupling for train telegraphs, for signaling from the cars to the engineer.

Beneath the locomotive cab is placed a galvanic battery. The cab contains an electric bell, which is connected with the battery wires, the electric circuit extending beneath the tender and cars to the rear car where the ends are connected. The wires are incased in a covering of wood by which they are insulated and protected from injury. In the cab of the locomotive is a switch for breaking the circuit when the locomotive is not in use. In each car of the train there are press buttons placed at convenient places.

## Time Furnished by Wire.

ON TAP LIKE LIGHT, HEAT, OR WATER—SYNCHRONIZED DIALS NOW IN USE.

A company was incorporated at Albany last week for the manufacture, use, lease, and sale of instruments for the indication of time by telegraph. A man who has for several years made a study of devices for this purpose said yesterday to a reporter:

"The idea upon which the company is based is a good one. That this organization has the capital and the practical men to make the enterprise a success I do not know. There is no doubt that in the principal business establishments of large cities, where correct time is a necessity, the clock will soon be a thing of the past. A synchronized dial plate, connected by electric wire with a central timepiece, will take its place. It is quite as feasible as furnishing electricity or gas or steam from a central manufactory. The Manhattan Elevated Railroad Company is now completing arrangements to place synchronized dial plates in its stations, all connecting with some standard timepiece, which will very likely be the clock in the Western Union building.

"This new company purposes to place central clocks in different parts of the city, which will be carefully regulated and frequently compared with some standard timepiece. Synchronized dial plates connected with these clocks will be furnished to whoever desires them at a regular tariff. Several of these synchronized dial plates are now in use in the city. There is one in Cooper Union, and two have recently been placed in a Broadway window of the Western Union Telegraph office, one indicating New York time, and the other Chicago time. These latter are connected with the large clock in the office of James Hamblet, superintendent of the time telegraph department on the fourth floor of the building. The minute hand on these clocks springs forward one space on the first second of each minute. Thirty miles of wire, running into one hundred offices in New York, Brooklyn, and the neighborhood is connected with Mr. Hamblet's clock. A bell is struck in each office on every quarter hour, by which timepieces may be regulated. Important enterprises in time telegraphy are on foot, and will shortly be made public."

A NEW CABLE.—According to the London *Times*, a new submarine cable will shortly be laid between France and Senegal.

Mr. J. B. Stewart is the chief operator on the Western wires at 195 Broadway. Mr. Stewart appears to be familiar with the switch and quadruplex, and handles his department in a satisfactory manner.

General Superintendent James Merrihew has been absent for some time, and Mr. W. J. Dealey alone presides at the manager's desk. Mr. Jos. E. Fenn, the well known electrician, has returned from a trip in the Provinces.

Among the rising young men in the telegraph business may be mentioned C. H. Irwin, Esq., the Assistant Supt. W. U. Tel. Co , at 195 Broadway.

The genial telegrapher, Mr. O. S. Wiley, who is manager at Newport, R. I., favored 195 with a visit on the 6th. He will remain at Newport this winter.

Years ago, when Barnum's Museum flourished, a friend of the great showman rushed in one day and asked excitedly if the Museum possessed the club with which the Indians attempted the life of Captain John Smith. The identical club was speedily produced, whereupon the questioner, who was something of a wag, said: "Good. I have been to all the other museums in New York, and they all have that club, and I just wanted to satisfy myself that you had it, too." That club was not more numerous than "the oldest telegrapher in the country" is rapidly becoming. The writer endeavored to show when one of the earlier operators died a few years ago, that the deceased was the oldest operator, whereupon an older one still revealed himself in Baltimore, and latterly no city of a hundred thousand inhabitants has failed to set up its claims to having "the oldest," etc. And now the small towns are being heard from; Morehead, Minn., being the most recent one to claim the telegraphic patriarch. Go on, friends; Oshkosh has not been heard from yet, and we want the bottom facts.

In the event of the establishment of postal savings banks in this country, where deposits as small as one cent may be received, a good opportunity will occur to test the old proverb which admonishes us to take care of the pence and let the pounds take care of themselves. In England last year such small deposits aggregated $12,500,000. Another instance of the result of this policy is afforded by the fact that the Bank of England has obtained $716,300 by reckoning in its own favor in settlements of transactions involving fractions of pennies.

The various systems of shorthand are well illustrated at a stenographic exhibition now open in Paris. Eighty-four different methods are shown, commencing with the system introduced in 1683 by the Scotchman, Ramsay, while the two greatest curiosities of the exhibition are a post-card, containing 44,000 words, and a stenographic edition of the Bible.

## A New Secondary Battery.

Some time ago we described the cheap and useful voltaic cell of Mr. Alfred Bennett, which consists of a zinc plate and an iron plate surrounded with iron filings; both being immersed in a solution of caustic soda. For convenience, the iron plate is sometimes made in the form of a containing vessel as it is the negative metal in this combination. Quite recently Mr. Thomas Farrington has employed this cell with good results as a secondary battery or accumulator. He has altered the cell slightly by using rusty iron in preference to clean iron in order that the oxide might be reduced to spongy iron by the hydrogen evolved. The result was that the cell gave a very constant current for some time, zinc oxide and spongy iron being formed in its direct or primary action. When employing the cell as a secondary battery the reverse action takes place and the zinc oxide is reduced to metallic zinc, whilst the spongy iron is oxidized. The cell is further improved by using carbonate of soda instead of caustic soda solution, and Mr. Farrington yet hopes to find a neutral salt which will give still better effects.—*Engineering, London.*

## A New Electric Railway.

The Austrian Ministry of Communications has granted to the Südbahn or Southern Railway Company the concession for the construction of an electric railway to run from Modling to Brühl in the suburbs of Vienna. This will be the first electric line in the Austrian capital. It will be about three kilometers, or two miles, in length, and will run from the Modling railway station, on the southern line, through the village of Modling, and thence through Klausen to Vorderbrühl. It will be a single line. The gauge is one meter, and the gradients are not to exceed fifteen in the hundred, while the minimum radius must not be smaller than thirty meters. The maximum speed allowed by the terms of the concession is twenty kilometers, or about twelve miles and a half an hour. There are to be halting and signal stations at the most frequented crossings, and they are to be connected together by telegraph or telephone apparatus. The carriages of the new line are to contain eighteen seats, besides standing room for a few more passengers. Each carriage will be fitted with its own electrical conducting apparatus, and the traffic will be worked by a stationary steam motor of at least forty horse-power, and two machines for the production of the electric current. The new line is to be finished and be opened for traffic by the 15th of July, 1883.

## Electrical Education.

We hear that the demand for tickets by students wishing to work in the electrical laboratory under Professor Ayrton, at the City and Guilds of London College, has now become so great that until the larger rooms at the new Finsbury College are ready, it has become a question whether any more tickets can be sold, since the 300 students now attending the electrical courses are even more than the present laboratories will accommodate. It is gratifying to find that this opportunity, offered by our city companies to workmen to obtain sound, cheap, technical education, has been so largely taken advantage of. Men in the employ of every metropolitan electric lighting company may be found among the students at the Finsbury College, and in some cases the students come regularly a distance of thirty miles, being employed during the day in the country. Some of the employers have shown the value they attach to their men being technically educated by paying themselves the college fees.—*Exchange.*

# Telephonic.

The Metropolitan Telephone and Telegraph Co. of this city are now doing more business and giving better service than at any time since the company was organized. The rebuilding of many lines, and the addition of new apparatus, seems to have entirely obviated many troubles, and the subscribers are now happy. The territory on Long Island and in New Jersey, which was formerly under this management, is now controlled by the new organization briefly spoken of elsewhere in this issue.

## Consolidating Telephone Interests.

HEAVY PURCHASES BY THE LOWELL, MASS., SYNDICATE IN NEW YORK AND NEW JERSEY.

Boston, November 6.—The announcement is made that the Lowell Telephone Syndicate, which controls 17,000 telephones in Maine, New Hamp-hire, Vermont, Massachusetts (except the city of Boston and southern Massachusetts), and three counties in New York State, including Saratoga, has purchased the Long Island Telephone Company—capital, $1,20 ,000—and including the city of Brooklyn, and the New Jersey Telephone Company—capital, $1,200,000. The latter includes virtually the entire State, excepting the cities of Newark and Camden. The right is given to purchase Newark, January 1, 1884, at the actual cost of the plant at that date.

The syndicate which acquires this property is composed of W. A. Ingham, C. A. Glidden and L. N. Downs, representing the Lowell interests, who take $250,000 of the stock; C. F. Cutter and J. C. Clark, of South Framingham, formerly president and manager of the Old Bay State Company; H. W. Hyde and C. A. Nichols, of Springfield, representing the western Massachusetts telephone interests; W. W. Crapo, of New Bedford, representing the Southern Massachusetts Telephone Company; ex-Governor Jewell, general manager, H. P. Frost and Morris F. Tyler, representing the Connecticut companies; Piper, Sawyer & Co., of Newburyport, and former owners of the Suburban Company; T. N. Vail and O. E. Madden, of the American Bell Telephone, of Boston.

It is proposed to take possession at once, and to organize the two companies as one, under a joint capital of $2,400,000. The programme, as now laid out, is to make C. F. Cutter, president; W. A. Ingham, vice-president; J. C. Clark, treasurer and general manager, with C. W. Clifford and H. P. Frost members of the Executive Board. The property is so purchased that there remains in the treasury of the new company funds to the amount of $200,000 for construction purposes. Further than this, the Metropolitan Company, of New York City, and the American Bell Company will waive their right to a dividend on $800,000 of stock, which, for perpetual contract, they are entitled to hold. The contract gives the new owners exclusive right for the use of the telephone, the Bell and the Gold and Stock patents, for the entire territory described. In this territory, on September 1, there were 16 exchanges, 260 subscribers, and 160 territorial lines.

## First Victim of Subterranean Telephony.

On Wednesday, November 1st, as a South Boston horse-car was passing through Congress street, one of the horses shied (presumably shocked by the unusual vision of the Greek slave, who in considerable force was present), and losing his balance, fell over into the trench just opened for the reception of the telephone tubes By an active use of ropes and planks, the unfortunate animal was extricated without suffering serious injury.

## Telephone Facilities.

The telephone company evidently means business. In developing a new territory like that of Charlestown, where the telephone system has been conspicuous by its absence, much more time has necessarily to be consumed than would be for extensions in cities where the telephone is a fixture. Unwearied labor by Division Superintendent Clarkson and his large corps of assistants, however, has led to an assurance that the central exchange on Hancock Square will be open for public business, day and night, on and after November 1. The new exchange in the second story of Reed's building is being tastefully fitted up and furnished, and an efficient staff of operators will always be in attendance twenty-four hours every day, Sundays and holidays included. Simultaneously the work of supplying telephones to subscribers will begin, and of these nearly forty have already been secured The company has built a line of 35-foot poles on Rutherford avenue with a capacity of forty wires; has in process of completion a line of poles from the Marginal Railroad along Medford street, and has placed a structure on Reed's building capable of holding two hundred wires. And these are only beginnings of the work which will perfect the telephone system in Charlestown to a standard second to none in the country.—*Charlestown (Mass.) Enterprise.*

Mr. J. D. Haines, Secretary and Treasurer of the Mexican Telephone Company, is still abroad in the city of the Montezumas, where his busy and active brain is performing wonders in the interests of the corporation he represents. Mr Haines is the right man in the right place, and the company did the proper thing when they sent him to Mexico to look after their business. May he return to us as smiling and jolly as he left.

Frederick Gower, of Maine, has made a million and a half by forming telephone companies in London, and Lilsan Norton, of the same State, is singing in Paris at $12,000 a year—and they are going to be married.

## A Grand Telephone Scheme.

New York and Philadelphia capitalists are visiting various sections of Eastern Pennsylvania, with a view of organizing a general telephone company to extend from New York to Pittsburg. A proposition has been made to purchase the East Pennsylvania Telephone Company's interest in the Schuylkill and Lebanon Valley, and similar propositions have been made to other telephone companies in this and other States. The idea is to consolidate all local telephone companies into one general organization, with main offices in New York, Philadelphia, Pittsburg and other cities.

The divers are learning to utilize the telephone. The managers of the Northern District Telephone Company, of England have recently made some interesting and satisfactory experiments in that direction. Conversation between the divers and those above was easily carried on, and tools were sent down in reply to telephonic request for them with as much facility as one's wife might order a dinner from the butcher.

Washington, Nov. 10.—Alexander Graham Bell, of telephone fame, to-day obtained his final papers of naturalization as a citizen of the United States. The preliminary papers were taken out in Massachusetts about four years ago.

## Aerial Photography and Telephony.

The Municipal Council of Paris having voted a grant of 1,000 francs to the Academy of Meteorological Ascension for the purpose of making experiments in aerial photography, an ascent was lately made by members of the Academy from the Carrefour de l'Observatoire. They carried with them an apparatus for taking instantaneous photographs. This had six lenses pointing to different directions, so as to embrace the whole of the horizon and to produce a panoramic photograph. The balloon rose 200 meters. A telephone was afterward fitted up in the car to enable the occupant to communicate with their friends below.

Application has been made at Ottawa, Quebec, for a charter incorporating the Canadian Magneto-Electric Light Company, limited, with a capital of $100,000. Dr. Gustavus Griffin, of Montreal, is President, and H. J. McHugh, of Quebec, and W. Y. Bolain, of Brooklyn, the electricians.

## The Transmission of Articulate Speech and Singing by Means of Telephones Without Wires Attached to Them.

Mr. Frederick John Smith of Taunton, has communicated the following note relating to his experiments on the above subject: "If a large coil of wire be made, from three to ten feet in diameter (these were the sizes tried), and placed in connection with a microphonic transmitter; then, if the transmitter is either spoken to or sung to, the voice is perfectly reproduced in a telephone consisting of only a magnet and disc, held within the great coil. The telephone will give its sound when held at any angle within the coil, but its greatest sound is when the disc is in the same plane as the coil. The effect is augmented if two coils, hung about a foot apart, and two telephones, without bobbins, be used, the head being placed between them. Perhaps the best result is obtained by using two coils of the form used in Gaugain's galvanometer, placed with their vertices pointing to each ear; two light discs and magnets are then attached to the ears by a spring; thus the operator is quite unincumbered by any wires whatever. The Gaugain coils are put in circuit, with a microphonic transmitter and battery, in the same way as the large coil."

Experiments similar to those described by Mr. Smith were made some time ago by Mr. Willoughby Smith, and referred to by him at one of the meetings of the Society of Telegraph Engineers and of Electricians during the present year. Perhaps our correspondent has not seen Mr W. Smith's pamphlet on "Induction," in which these experiments are described.

## Underground Telephone Wires.

There is a good deal of unreasoning agitation in regard to putting telephone wires underground, and the legitimate and feasible plan of subterranean telegraph cables at least in cities, is assumed, without any knowledge of the facts, to be applicable to telephone wires also We are assured by practical electricians of high authority that it is impossible to work underground telephone lines under the conditions prevailing in our large cities, and any steps to secure by legislation the removal of the wires from our streets should, so far as they affect telephone lines, be preceded by an inquiry whether or not it is at all possible.

Some philosopher says that only the diver brings up the pearl, but many a diver is bitten in two by a shark before he gets anywhere near a pearl.

## COMPARISON OF ELECTRO-MOTIVE FORCE OF BATTERIES.

| No. | Name. | Negative Pole. | In. | Positive Pole. | In. | Electro-Motive Power. |
|---|---|---|---|---|---|---|
| | | | | | | Volts. |
| 1 | Daniell (Telegraph) | Amalgamated Zinc | 1 Sulphuric Acid, and 12 Water.... | Copper | Saturated solution of Sulphate of Copper in Water | 0.978 |
| 2 | Daniell | Amalgamated Zinc | 1 Sulphuric Acid, and 12 Water.... | Copper | Nitrate of Copper & Water (saturated) | 1.000 |
| 3 | Marié Davy | Amalgamated Zinc | 1 Sulphuric Acid, and 12 Water.... | Carbon | Paste of Protosulphate of Mercury and Water | 1.524 |
| 4 | Le Clanché | Amalgamated Zinc | Water containing Sal-ammoniac.... | Carbon, surrounded by Peroxide of Manganese and Carbon particles | Water and Sal-ammoniac | 1.481 |
| 5 | Bunsen | Amalgamated Zinc | 1 Sulphuric Acid, and 12 Water .. | Carbon | Nitric Acid (fuming) | 1.964 |
| 6 | Bunsed | Amalgamated Zinc | 1 Sulphuric Acid. and 12 Water.... | Carbon | Nitric Acid (1.38) | 1.888 |
| 7 | Chromate | Amalgamated Zinc | 100 Water, 12 Chromate of Potassium, and 25 Sulphuric Acid | Carbon | 1 Sulphuric Acid, and 12 Water | 2.028 |
| 8 | Grove | Amalgamated Zinc | 1 Sulphuric Acid, and 4 Water | Platinum | Nitric Acid (fuming) | 1.956 |

Specific Resistance (or resistance of one cubic centimeter) of Carré's electric carbons=3927 microhm.
Do. do. (do.) of pure copper=1 microhm, 616.
Proportion, 1 to 2430.
Resistance of a carbon pencil (Carré's make) one meter long, one millimeter diameter=50 ohms.
Resistance of carbon pencils of one meter length at 20° cent.—

| Diameter. | Resistance in ohms. | Diameter. | Resistance in ohms. |
|---|---|---|---|
| 1 millimeter | 50 | 4 millimeter | 3.125 |
| 2 " | 12 50 | 5 " | 2.00 |
| 3 " | 5.55 | 6 " | 1.39 |

**Dimensions of Cores of Important Cables.**

| Name of Cables. | Copper Conductor: Total Weight in lbs. per Knot. | Copper Conductor: Total Diameter of Conductor=$d$ | Gutta Percha: Weight in lbs. per Knot. | Gutta Percha: Diameter in inches=$D$ | Approximate ratio $\frac{D}{d}$ |
|---|---|---|---|---|---|
| Red Sea Cable | 180 | 0.105 | 212 | 0.34 | 3.4 |
| Malta, Alexandria Standard | 400 | 0.162 | 400 | 0.457 | 2.95 |
| Persian Gulf | 225 | 0.109 | 275 | 0.38 | 3.48 |
| First Atlantic | 100 | 0.083 | 260 | 0.38 | 4.1 |
| Second Atlantic | 300 | 0.144 | 400 | 0.464 | 3.28 |
| England and Holland | 143 | 0.095 | 223 | 0.34 | 3.47 |
| Toulon and Algiers | 107 | 0.083 | 223 | 0.34 | 4.26 |
| Varna, Balaclava | 73 | 0.062 | 166 | 0.3 | 4.84 |
| French Atlantic | 400 | 0.159 | 400 | 0.463 | 2.92 |

### The Telephone in Russia.

The telephone business stands in peculiar circumstances, and each town has its own peculiarities.

Odessa depends on the export of grain. This year there has been no harvest, or at least a fair one, so business suffers on account of it. One hundred and forty subscribers are working already.

Warsaw is principally a manufacturing town and very large; has now one hundred and fifty-four subscribers, and adding daily.

Moscow, the center of the Russian Empire, is very far behind Europe in progress; the business catches on slowly; has one hundred and fifty subscribers connected and doing well.

Riga is a small seaport town; has, however, many factories on the outskirts, but the people want private lines rather than central office system; has only seventy connected.

St. Petersburg has a mixed business, but is not very enthusiastic for connections. People are getting, however, to appreciate the instruments and are coming over very quickly; has over three hundred subscribers.

Many government institutions have subscribed, among them twenty-one police stations, the secret police, high court, minister of interior.

St. Petersburg being built up of many islands will have to be cabled in many places.

Among the reasons that are injurious to the telephone business, belong 1st, bad times, consequent on the war with Turkey; 2d, the Russian has no idea of the value of time, and is never in a hurry to do anything.

V.

The wit of Sergeant Ballantine appears to be of a very caustic character. When, some years ago, a distinguished journalist was forced to appear in the witness box, the Sergeant, just before cross-examining him, entirely deprived him of his self possession by coolly observing, "There is flour on your nose, sir." On another occasion he publicly rebuked Mr. Justice Hawkins—then Mr. Hawkins, Q. C.—for his inveterate love of accumulating wealth, assuring him that he had much more money than he would ever need in this life, that he could not possibly hope to take the surplus away with him, and that if he did it would most certainly melt."

### St. Chamas, France.

The Government powder manufactory is now lighted with an Edison plant. This installation has some special features. The wires are all outside the building and all lamps are in recesses in the walls, with a pane of glass in front, between the lamp and the interior. The officials have expressed themselves as being well satisfied, and it is probable that an Edison plant will also be installed in the arsenal.

### On the Galvanic Conductivity of the Non-Metallic Bodies.

By M. Slouguinoff.

The feeble conductivity of the non-metals as compared with the metals seems to depend on a more complicated structure of the molecule. As the temperature rises the molecule grows more simple and the conductivity increases. Diamond is a non-conductor, because, according to Mendelejeff, its molecule is more complicated than that of graphite and charcoal. The molecule of conductive red phosphorus is simpler than that of the non-conductive yellow variety, as is confirmed by certain chemical considerations. Certain non-metals conduct in the gaseous condition, which is to be explained in the same manner.—*Wiedemann's Beiblätter.*

### Charging Accumulators.

Owing to the high resistance of electric incandescent lamps as compared with arc lamps, the ordinary dynamo cannot be used to feed them unless they are arranged in parallel arc to reduce the resistance of the lamp circuit, or unless the electro-magnets of the machine are in a shunt circuit of high resistance derived from the circuit of the armature. If resistance coils are added to the magnets to bring up the resistance of this shunt circuit, there is a waste of power in them, and as Mr. R H. M. Bosanquet points out, it is better to employ incandescent lamps instead, for then this power is turned into light. The lamps may, however, be replaced by accumulators which are charged by the shunted magnet current. Mr. Bosanquet finds that under certain conditions a balance is established, so that the potential difference on on the two sides of the magnet circuits is small, and that so long as this balance is maintained there is no tendency to reversal.

### Prices of Telephone Stocks at Boston Stock Exchange.

| American Bell Telephone Co. | | Mexican Bell Telephone Co. | |
|---|---|---|---|
| Oct. 26, 1882 | 173 | Oct. 26, 1882 | 3¾ |
| " 27, " | 174 | " 27, " | 4 |
| " 28, " | 173 | " 28, " | 4 |
| " 30, " | 173 | " 30, " | 3¾ |
| " 31, " | 175 | " 31, " | 3¾ |
| Nov. 1, " | 174 | Nov. 1, " | 3¾ |
| " 2, " | 174 | " 2, " | 3¾ |
| " 3, " | 175½ | " 3, " | 4 |
| " 4, " | 177¼ | " 4, " | 4 |
| " 6, " | 182¼ | " 6, " | 4 |
| " 8, " | 183 | " 8, " | 4 |
| " 9, " | 180 | " 9, " | 4 |
| " 10, " | 179 | " 10, " | 4 |

The Olmsted Electric Light and Power Company of New York, was incorporated at Albany on Nov. 6, with a capital of $1,000,000.

An enterprising photographer on Broadway has placed in his window a small dynamo in operation, with the announcement: "Photographs taken on the ground floor from morning till night by the electric light."

The total assessed value of real and personal property in the State of New York is $2,783,682,567, of about $500 average to each individual of the population.

Messrs. Charles L. Knapp & Co., of Lowell, Mass., who make a specialty of telephone stocks, have issued several circulars illustrating the growth of the telephone business in New England. It is stated that the title "Eastern Company," as used, is likely to mislead. The various companies, *i. e.*, National Bell of Maine, Boston and Northern, Bay State, Suburban, Union, and Granite State, make up what for convenience is called the Eastern Company, but no actual consolidation exists. Each is now independent of the other, though governed by the same executive officers, whose headquarters are at Lowell, excepting only the Granite State Company, whose headquarters are at Manchester, N. H.

An electric light tower (Fuller system) has been erected in Bridge Square, St. Paul, Minn., overlooking the Mississippi River. It contains six lamps, each of 2,000 candle power. If the light is found to be insufficient the mayor promises to increase it to twelve lamps. Some objection has been raised to the height of the lamps, the objectors claiming that better service would be obtained if the lights were about half as high. The tower stands 200 feet from the ground.

### Device for Laying and Holding Underground Electric Wires.

An improved device for laying and holding underground wires, recently patented by Dr. H. C. Register, of 1907 Chestnut street, Philadelphia, Pa.

In this device there is a water-tight longitudinal boxing, of cast or sheet iron, or of wood or clay, placed in the street under the roadway, and at suitable intervals it is provided with enlargements having manholes leading to the street. On the bottom of the longitudinal box there are two or more longitudinal troughs or compartments, some for telephone and telegraph wires, and the others for electric light wires. Two partitions on the bottom of the longitudinal box extend throughout its entire length, and near the upper edges of these partitions a series of rollers are journaled. In each enlargement at the end of a section, and at suitable intervals in the longitudinal box, is journaled a horizontal shaft, each carrying a grooved pulley directly above the middle line between the partitions. Endless ropes pass over these pulleys, and the ropes can be moved by turning the shaft by means of hand wheels at the manholes.

A carriage rests on the upper edges of the partitions, and can be firmly clamped to the endless rope. In operation the clamping carrier is fastened to the rope at one manhole or enlargement of the box, and one or more wires are attached to the pegs or staples of the carrier. By rotating the shaft the carrier will be carried to the next enlargement or manhole, and the wires will have been carried through the longitudinal box from one station or enlargement to the next, and can easily be placed into one of the compartments of the box. In this manner the wire can be carried through any length of boxing, for when the ends of the wires have arrived at one station —that is, at the end of one section of the boxing—the wires can be attached to the carrier of the next section, and so on. The wires can be removed in a slmiiar manner.

### Two Hundred Miles of Oysters.

The joy caused in gastronomic and epicurean circles by Mr. Olsen's paper on "The North Sea Fisheries," and the great oyster discoveries there, will be shared by the whole oyster-eating world. Two hundred miles of oyster-beds, thirty to seventy miles wide, that is to say, 10,000,000 acres of splendid oysters within easy distance of the British coast, is a discovery to which all those of Stanley and Livingstone sink into insignificance. One curious feature about it is that the oysters lie at a depth of twenty-one fathoms, thus disposing summarily of the prevalent idea that oysters can only be raised successfully in shallow water. The man who invents a new dish, according to some, the man who plants a tree according to Mohammedans, deserves well of mankind; but what is the reward of a man who discovers 10,000,000 acres of oysters? And yet all this is tinged with the melancholy doubt whether oysters will be cheaper in consequence.

### Business Notice.

Parties in want of electric light machinery are offered an unusual opportunity to buy such at low prices, by Jerome Redding & Co., of Boston. See advertisement on page 283.


A. C. NORTHROP,

WATERBURY, CONN.

IRON AND BRASS MACHINE SCREWS,

Zinc in Sheets and Plate

FOR ELECTRICAL PURPOSES.

PARTS FOR TELEGRAPH AND TELEPHONE INSTRUMENTS

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The "MORSE" LEARNERS' INSTRUMENT THE BEST.

PRICE $3.75, complete with Battery, Book of Instruction, Wire, Chemicals and all necessary materials for operating.

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|---|---|
| "Morse" Instrument alone, without battery | $3.00 |
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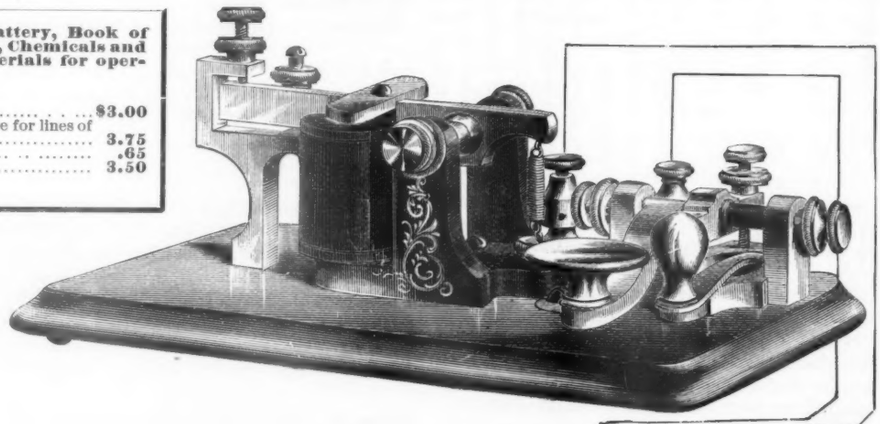
| Cell of battery complete | .65 |
| "Morse" Learners' Instrument, without battery, sent by mail | 3.50 |

(Battery cannot be sent by mail.)



☞ Goods sent C. O. D. to all points if one-third of the amount of the bill is sent with the order. Remit by Draft, Postal Money Order, or Registered Letter. Favorable arrangements made with Agents everywhere.

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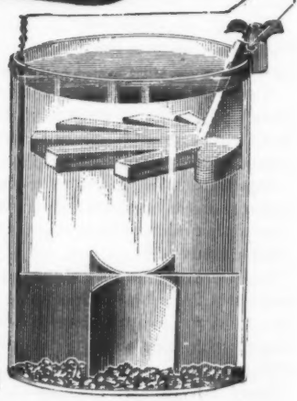

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IT IS THE BEST WORKING SET OF LEARNERS' INSTRUMENTS FOR SHORT OR LONG LINES, FROM A FEW FEET UP TO TWENTY MILES IN LENGTH, YET OFFERED.

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The Company **BUYS** its telephones and transmitters, and thereby avoids paying royalties.

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Operating under license from the TROPICAL and AMERICAN BELL TELEPHONE COMPANY for the Islands of Hayti, San Domingo, Jamaica, Porto Rico, St. Croix, Vicque and Culebra, has been granted concessions from the Governments of the Islands for exclusive right to the exchange system for telephones. This Company **BUYS** their **TELEPHONES** and **TRANSMITTERS,** thereby avoid paying royalties.

**A PORTION OF THE STOCK FOR SALE.**

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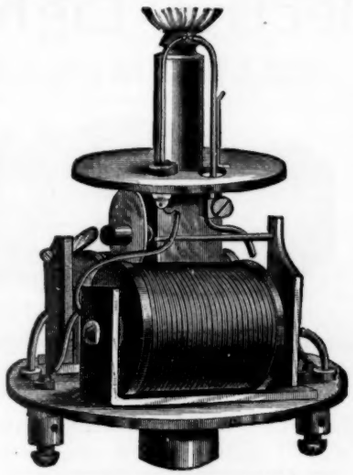

Patented May 31, 1881; April 25, 1882; May 2, 1882.

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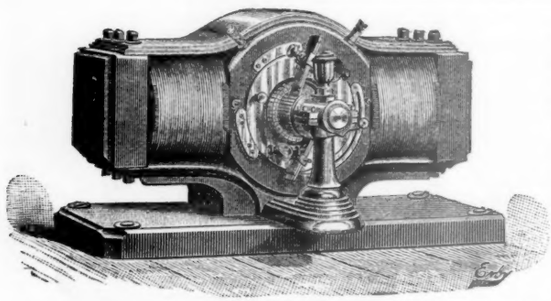

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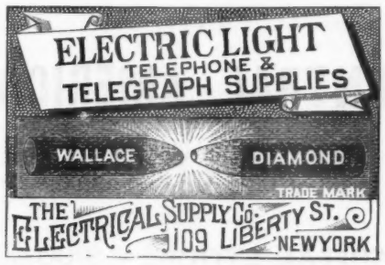


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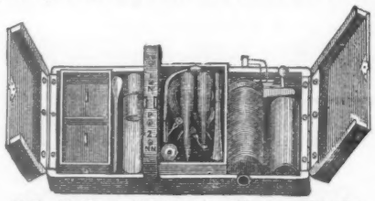

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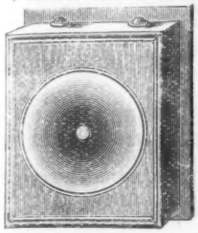

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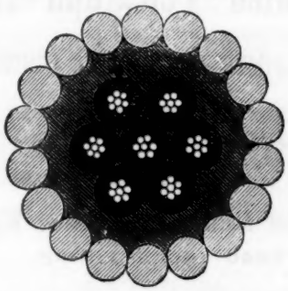

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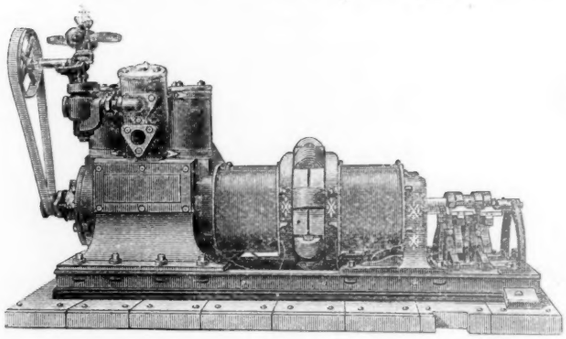

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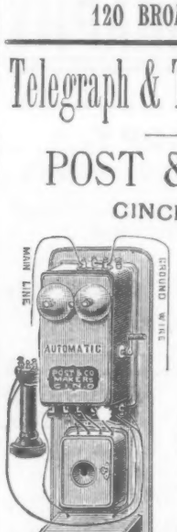


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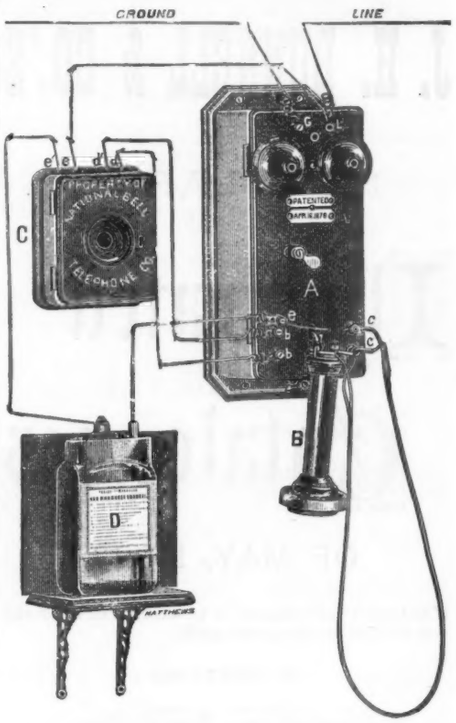


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